Burton Mesa Ecological Reserve
Fuelbreak Project
October 18, 2004

Vascular Plant Field Assessment
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Introduction: The following documents the results of a series of field evaluations of vascular plant species for the Burton Mesa Ecological Reserve Fuelbreak Project. The 5000 + acre Burton Mesa Ecological Reserve is owned by the California State Lands Commission and managed by the California Department of Fish and Game. It is located in northern Santa Barbara County, in the general vicinity of the unincorporated communities of Vandenberg Village, Mission Hills and Mesa Oaks, north of Lompoc. The purpose of this analysis is to identify sensitive plant species and sensitive plant habitats occurring within potential fuelbreak locations.

Seventeen potential fuelbreak areas were examined in the field over the 2003 and 2004 growing season and are shown in Figure 1 (Craig Turner). The assessment area typically was a band of habitat of variable width (up to 300 feet) located at the urban/wildland edge, or along existing roadways.

Methodology: Table 1 shows the dates that field assessments were conducted in 2003. Field work in 2003 emphasized examination of proposed Segments 1-8. Field work was conducted between February 4, 2003 and April 10, 2003. A followup examination was made of Segment 1 on May 30, 2003. Surveyed segment widths are also shown in Table 1. The width surveyed varied, from 300 feet in Segment 1 to 200 feet in Segments 7 and 8. A narrower band, about 50 feet wide, was examined in Segments 3, 4, and 5. Segment locations and survey widths were based primarily upon input we received from the Santa Barbara County Fire Department, specifically, Mr. Steve Hobbs, Fire Captain, Vegetation Management Unit.

Table 2 shows the dates that field assessments were conducted in 2004. Field work in 2004 emphasized conducting a late spring field visit to Segment 8 which had only received an early spring visit the year before, in February 2003. The remaining surveys were conducted from late April through late May, starting with Segment 9 and completed for all the remaining Segments. We did not re-examine Segments 1 though 7 in 2004. Surveyed widths varied, but generally the maximum width surveyed was 300 feet.

Field work in 2003 was conducted by Mary Meyer, Plant Ecologist with the South Coast Region, Department of Fish and Game and Anne Macleod, Scientific Aid also with the South Coast Region. Additional assistance in conducting field assessments in 2004

was provided by Diana Hickson, Associate Botanist with the Department's Vegetation Classification and Mapping Program. In 2004, we generally worked in teams, overseen either by Mary Meyer or Diana Hickson. Other team members included Kari Lewis, Teresa La Blanc, and Craig Turner from the Department's Lands and Facilities Branch in Sacramento and Terri Stewart, Senior Lands Supervisor for the South Coast Region.

Surveys consisted of meandering through the segment on foot and documenting all vascular plants encountered. Surveys emphasized locating rare and/or sensitive vascular plant species, primarily herbs, which could be affected by fuel reduction activities. Surveys also emphasized describing vegetation conditions relative to sensitive/endemic Burton Mesa chaparral shrubs and subshrubs. Sensitive/endemic Burton Mesa shrubs and subshrubs can be very common and often dominate or share dominance in vegetation stands at the Burton Mesa Ecological Reserve. Sensitive shrub and subshrub species are targeted for removal in some locations to achieve fuel reduction goals, but are often too widespread to map beyond a general level.

General information on the vegetation found within potential fuelbreak segments was also gathered. This information is available for further analysis but has not been analyzed in this report. (Cover was approximated for most chaparral dominants in a given stand. Department staff also periodically conducted a RAPID assessment of vegetation in a given stand at various locations within various segments. This procedure allows for the ocular estimation of cover for dominant and co-dominant species within a given stand area).

All vascular plants found to be in a recognizable condition were recorded and are listed in Table 3. Identification of some plant species was confirmed in consultation with Mr. Steve Junak, curator of the herbarium at Santa Barbara Botanic Garden (SBBG). Some specimens of rarer herbs were vouchered at SBBG. Botanical nomenclature generally follows the Jepson Manual (Hickman, 1993).

Weather conditions in 2003 were generally good, with about average levels of rainfall for this area. Several spring storms maintained good growing conditions for herbaceous annuals, particularly from the months of March through late May. Weather conditions in 2004 were substantially drier with very little spring rainfall recorded. For these reasons, it is possible that rare herbs may have been missed or may not have been detected in those segments that were only examined in late spring of 2004.

Results: A list of vascular plant species observed during the course of the surveys is included in Table 3. Sensitive plant species located within the surveyed fuelbreak segments are discussed individually below.

Sensitive Herbs

Seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis*)

Seaside bird's beak is a state listed endangered plant species, generally occurring in sandy soils west of Lompoc in Santa Barbara County, and in the Monterey Bay area region of Monterey County. This species is a hemi-parasitic annual herb that blooms from May through October. In the Burton Mesa area, its preferred habitat is generally sparsely vegetated to sometimes disturbed open areas within chaparral and woodland habitats. Typical sites include sandy margins of fuelbreaks; sandy, infrequently traveled dirt roads and trails; and sparsely vegetated sandy banks or slopes (Keil and Holland, 1998).

Presence on the Site: A single population of seaside bird's beak was observed in the vicinity of the existing sewer line access roadway and easement in Segment 1 of the proposed fuelbreak. A population of about 500 individuals was observed in April of 2003. The general area is sparsely vegetated with considerable exposed open sand habitat. It was likely disturbed for installation/maintenance of the sewer line in the mid 1990's. Plants are scattered in dense groups to occasional individuals. Associated species include the shrub, mock heather (*Ericameria ericoides*), and numerous native annual herbs that favor open sand habitats. Non-native weeds are infrequent in this area. The bulk of this population is found immediately west of the sewer line easement roadway, with only occasional individuals present east of the sewer line easement roadway.

Recommended Mitigation Measures: The single known population will be fully avoided during any fuel reduction work that may occur in this area. Avoidance measures would include:

1) Conduct a spring survey in the year prior to implementing fall fuel reduction work, in order to locate the full extent of the population within the segment;
2) Utilize temporary fencing, flagging or other appropriate measures to mark occupied habitat areas on the ground to prevent trampling or damage;
3) Ensure any staging and material handling areas are located at least 100 feet away from any known population/individuals;
4) A botanical monitor will be present during work to oversee and ensure that full avoidance is implemented.
5) Implement measures to reduce weed introduction within the segment.

There is potential for dormant seedbank of undetected seaside bird's beak populations to be stimulated to germinate in fuelbreak treatment areas following fuel reduction work (including outside Segment 1). There is therefore potential for a yet-to-be-observed population to appear within fuelbreak areas. Subsequent maintenance of the fuelbreak could adversely impact individuals or populations. To address this potential, the following measures should be implemented:

1) Following initial implementation of fuel reduction work, a spring survey will be performed to determine whether populations of seaside bird's beak, or other rare herbs, have been stimulated to emerge by fuel reduction work. Any areas encountered will be mapped and documented.

2) Subsequent maintenance activities will be implemented to fully avoid any direct or indirect impacts as described in 1-5, above.

Should a population germinate and grow on any area designated as a Fire Department Emergency Vehicle Access route, the following measures should be implemented:

1) Driving over growing plants during a wildfire emergency is acceptable and should result in only short term, minor impacts.

2) Roadway maintenance should only be allowed in the late fall, after the plant has produced a substantial portion of its annual seed production. Use of heavy equipment or major earth moving would be prohibited within the occupied habitat area. Activities that might result in "take" of this species by individuals outside the Department of Fish and Game, may require an incidental take permit pursuant to Fish and Game Code Section 2081(b). Additional CEQA compliance may be required to support issuance of such a permit.

Hoover's bent grass (*Agrostis hooveri*)

Hoover's bent grass is a tufted perennial member of the Poaceae and is listed by the California Native Plant Society (CNPS) in their List 1b. The species is found on dry sandy soils in open chaparral and oak woodlands at elevations less than 600 meters, and is restricted to northern Santa Barbara to southern San Luis Obispo Counties (Keil and Holland, 1998).

Presence on the Site: Hoover's bent grass was observed at two locations- three individuals were observed in September 2004 just east of the central open sand habitat in Segment 1, and a population of about 30 individuals was located in the southeast portion of the South Vandenberg Village segment.

Segment 1: Three individuals were observed adjacent to the riparian area in open sand habitat. There may be other individuals in the area that were overlooked, as it was just outside of the surveyed portion of Segment 1.

Recommended Mitigation Measure:

1) Locate additional individuals, if present, and flag occupied habitat to prevent trampling or removal.

2) A botanical monitor will be present when work occurs to ensure occupied habitat is avoided.

Segment SVDBVillage: A population of about 30 plants was observed in June of 2004. They are located at about 30 feet south of the existing dirt roadway immediately south of the existing residences located on Stardust Road, west of Moonglow Avenue. They are just east of the confluence of the dirt roadway and an old foot trail heading southwest off the roadway. The occupied area is about fifty feet long and 30 feet wide. (g.p.s. reading for the vicinity: 34 degrees N, 41' 559; 120 degrees E, 28' 436, NAD 27 CONAN). The general area has been disturbed in the past, probably by past fuel reduction work, off road vehicles and utility maintenance activities. Individual Hoover's bent grass was often found growing near purple needle grass (*Nasella pulchra*) and the invasive Veldt grass (*Ehrharta calycina*). All individuals encountered appeared stressed by low levels of rainfall in 2004. Some individuals were also being subjected to heavy browse, probably by brush rabbits, especially on individuals located near the cover of shrubs.

Recommended Mitigation Measures for SVDBV Segment:

1) Conduct subsequent surveys during average to higher levels of rainfall to ensure the full extent of the population has been detected, and conduct a spring survey during the growing season prior to any fuel reduction work in the area;

2) Utilize flagging, temporary fencing or other measures to demarcate the population and a surrounding 30 foot buffer, and allow no ground-disturbing activities within that area;

3) To prevent accidental damage to the population from utility maintenance, either a) install a post and cable barrier along the existing disturbed dirt roadway to prevent vehicles from leaving the roadway or turning around on the population (utility vehicles were observed using the area to turn around their trucks and trailers in June 2004); or b) place a row of large boulders along the side of the existing dirt roadway to prevent vehicles from driving into the area. A designated turn around area should be defined at the west end of this dirt roadway where the terrain precludes vehicle travel.

4) Develop and implement a plan to control the spread of Veldt grass in the vicinity of the Hoover's bent grass population.

Straight-awned spineflower (*Chorizanthe rectispina*)

A population of this very rare herb was located on the southern end of Segment 1 near Highway One. This species is an annual herb in the buckwheat family

(Polygonaceae). It is reported to occur in sandy openings in chaparral and dry woodlands and coastal scrub in Monterey, San Luis Obispo and Santa Barbara Counties (Hickman, 1993). The species is a CNPS List 1b. To date, the species has only been collected from one other location in Santa Barbara County, by Dr. David Keil- it was found in an opening near the picnic area east of Lompoc-Casmalia Road (Keil and Holland, 1998). The population at Segment 1 is the second known occurrence for the county (Steve Junak, pers. comm.).

Presence in the site: The single population of about 200 plants (2003) was found growing just southeast of the sewer easement road, and generally straddles a footpath/game trail that skirts a young coast live oak. It was observed growing in sparsely vegetated grassland, gently sloping to the south east, which was likely disturbed in the past, possibly during construction of Highway One. It was growing with tarplant (*Hemizonia fasciculata*), fescue (*Vulpia myuros*), red brome (*Bromus madritensis rubens*), and occasional purple needle grass (*Nasella pulchra*). Occupied habitat was about thirty feet across and about 50 feet long, staddling the foot path. A short distance away, within a few feet, the more common and widespread *Chorizanthe diffusa* abruptly becomes dominant and no more straight-awned spineflowers were seen.

Sometime during the month of October, 2004, the Vandenberg Community Services District implemented sewer manhole maintenance activities and essentially bladed through the bulk of this population, scraping the soil surface up to four inches deep. This area should be observed to determine whether the population will recover from blading and to prevent spread of nearby Veldt grass into this new disturbance.

Recommended Mitigation Measures:

The population will be fully avoided by implementing the same fuel break preconstruction survey and avoidance measures as well as subsequent maintenance avoidance measures as described for seaside bird's beak. In addition, it is critical that a Veldt grass control program be initiated in this general area, due to the proximity of this population to Veldt grass populations which are rapidly expanding along the Highway One corridor. Control of off road vehicles in this general location should also be implemented to reduce potential damage to the spineflower population.

Curly-leafed monardella (*Monardella undulata*)

This species is an annual member of the mint family and is CNPS List 4 plant. It is found in coastal sand dunes from Sonoma County to Santa Barbara County, where it reaches its southern most limit on Vandenberg Air Force Base (Keil and Holland, 1998). Both locations on the preserve where this species was observed were generally sandy, sparsely vegetated openings with few other annual or perennial plant species growing in the immediate area.

Presence on site: Populations of curly-leafed monardella were found at two fuelbreak locations, Segment 1 and Segment 10.

Segment 1: A population of around 40 individuals was found growing in a localized area just south of the central open area along the sewer easement in Segment 1. Most of the plants were found just beyond the edge of the sewer sandy roadway and near the central manhole. Occupied habitat was about thirty feet by fifty feet. The habitat area is mostly sparsely vegetated open sand, with scattered individuals of sand-loving small annual herbs. *Mucronea californica* is common and dominates the herbaceous cover here in mid spring. Later in the summer, *Lessingia glandulifera* var. *pectinata* becomes dominant.

Recommended Mitigation Measures: The occupied habitat area will be fully avoided by implementing the same fuel break preconstruction survey and avoidance measures as well as subsequent maintenance avoidance measures as described for seaside bird's beak.

Segment 10: A population of around 100 curly-leaved monardella's was located on open sand in the northwesternmost corner of the segment, and potentially may lie just outside the northwest segment boundary on an adjacent private land parcel. Plants were found growing on open sand between established stands of chaparral vegetation, on an old roadbed or path. (g.p.s. location in vicinity: 34 degrees N, 43.038'; 120 degrees E, 26.921', NAD 27 CONAN)

Recommended Mitigation Measures:

The occupied habitat area will be fully avoided by implementing the same fuel break preconstruction survey and avoidance measures as well as subsequent maintenance avoidance measures as described for seaside bird's beak. Currently, further fuel reduction work is not being proposed here because existing fuel clearance appears to be adequate. If this changes, spring surveys prior to any fuel reduction work should be performed, and other open sand habitats on the Ecological Reserve near the population should be re-examined to ensure that populations are detected so avoidance measures can be implemented.

California spineflower (*Mucronea californica*)

California spineflower occurs both in coastal and interior sites from Monterey and Kern County south to San Diego County. It is a CNPS List 4 plant. The species is common to locally abundant on the Burton Mesa Ecological Reserve (Mary Meyer, pers.obs.) and Vandenberg Air Force Base (Keil and Holland, 1998). The species occurs in sandy open habitats, often in coastal scrub, coastal dune scrub, and openings in chaparral to elevations of 1400 meters. California spineflower is a low growing annual, producing dark red, unique spiny bracts and pale white flowers which attract abundant insect pollinators. This species has also been identified as the host food plant for larvae of the

rare La Purissima blue butterfly, currently known to exist at only one location in the world, NW of the intersection of Harris Grade Road and Burton Mesa Boulevard.

Presence in the Site: California spineflower is extremely common at the Burton Mesa Ecological Reserve and is typically seen growing abundantly in sparsely vegetated openings, particularly those which lack annual grass cover. The only fuel break segment where the species was specifically mapped was in the previous Segment 1, where a group of rare annual herbs co-occurs with this species. Most other proposed fuelbreak segments contain localized to widespread populations of this species in areas lacking tree, shrub and perennial herb cover and with sparse cover of annual grasses.

Recommended Mitigation Measures:

Full avoidance of habitat occupied by this species outside Segment 1 is generally not feasible, because the species is common and frequent. Currently, proposed procedures for implementing fuel reductions should help minimize adverse impacts to this species. These procedures include efforts to locate staging and chipping areas in the most disturbed sites and measures to reduce the spread of weeds by personnel and equipment. Removal of vegetation in the fall and early winter months prior to significant precipitation will also help minimize impacts from trampling young, fragile rosettes of California spineflower.

Small-seed fiddleneck (*Amsinkia spectabilis* var. *macrocarpa*):

Small-seed fiddleneck is an annual member of the Borage family. It has showy yellow to orange flowers on prickly/hairy stems and grows to be about 1.5 feet tall. The subspecies is a local endemic found only in Santa Barbara and San Luis Obispo Counties, generally near the coast in sandy areas. It is not currently listed by the CNPS. To date, locations on the Ecological Reserve where this species was seen exhibit localized disturbance and often are sites that have been mowed in the past, which favors the conversion of shrubland to ruderal habitats dominated by annual grasses and weedy forbs. Small-seeded fiddleneck seems to do well in these conditions.

Presence on the Site: This subspecies was observed at a number of locations within various segments of the proposed fuelbreak. Generally, it was found growing within habitat that were previously disturbed by vegetation thinning and mowing. Often, it was found in small patches that appeared to have missed being mowed. Patches were generally five to twenty feet in diameter. (Areas that appear to have been previously mowed on the urban/wildland interface on the Ecological Reserve do not appear to be maintained on a consistent, annual basis- for instance, no evidence of mowing in 2004 was observed in areas where this species was found). These types of small patches support populations of a couple of hundred individuals.

The presence of this subspecies was generally noted during surveys but not mapped in detail. A single population was observed in a disturbed area where a dead live oak had

been removed for firewood in the central area of Segment 1 near the sewer road. Another small patch was observed behind the Little League field in Segment 3 (g.p.s. location: 34 degrees N, 42'522; 120 degrees E, 28'472, NAD 27 CONAN). Another patch was observed south of the substation west of Rucker Road (g.p.s. reading in the vicinity: 34 degrees N, 41.48.9"; 120 degrees E, 26.16" NAD 27 CONAN). Another patch was observed on what is probably private property north of the existing church in the north Rucker Road segment.

Recommended Mitigation Measures:

Adverse impacts to localized populations of small-seeded fiddleneck from annual mowing can be minimized by timing mowing late in the spring after most of the fiddleneck flowers have set seed and the seed has hardened off. Generally, mowing at the very end of May should be effective in avoiding damage to annual seed production. However, a botanist should examine populations in the affected area to confirm that this timing method will be effective. Periodically, mowed fuelbreak locations should be examined every few years to determine if additional populations have arisen and to document that the prescription is allowing the species to persist in these locations. It would also be important to ensure that chipping areas and staging areas are not placed at locations that would damage fiddleneck populations.

San Luis Obispo Wallflower (*Erysimum capitatum* ssp. *lompocense*):

The San Luis Obispo wall flower (should be Lompoc wallflower) is a perennial herb that occurs on sandy hillsides, mesas and back dunes in central dune scrub and maritime chaparral at elevations less than 500 meters. It is endemic to sandy hills about Lompoc, including the La Purissima Mission and Burton Mesa (Smith, 1998). It is on the CNPS list 4. This species exhibits a biennial habit- populations include low growing first year individuals which do not elongate and flower, and older individuals that can reach three to four feet in height when blooming. We frequently observed this species to be grazed off at about one foot in height in early spring, probably by mule deer. The grazed individuals subsequently produce numerous lateral branches which proceed to mature and flower. Grazing damage later in the season was not observed.

Presence at the site: This herb is fairly common in localized areas of the Burton Mesa Ecological Reserve. It seems to be observed most often in association with Burton Mesa scrub, rather than Burton Mesa chaparral (manzanita dominated) stands. Often, wallflowers grow up through the base of lower growing shrubs such as mock heather or California sage brush. These may represent locations where they are more protected from deer browse. Wallflower populations were noted during field work but generally they were not mapped at a specific level.

Segment 1: Several groups of wallflowers were observed immediately west of the sewer roadway, midway between Highway 1 and the urban area. About 25 plants were observed just off the edge of the roadway, under the drip line of a large oak in a location

that receives little direct sunlight due to shading by large willows which are on the east side of the roadway (about five feet wide at this location). This group is vulnerable to damage from road maintenance or widening that may be undertaken by the Community Services District, or efforts to widen the sewer roadway under this project for fire department access. Another 25 to 50 individuals were scattered, continuing to the northwest around the north side of the oak woodland dripline. An additional 75-100 individuals were observed growing throughout the adjacent low growing Burton Mesa scrub. This portion of the wallflower population (the portion not on the edge of the sewer roadway) is not within the currently proposed Segment 1 boundary. (The population was gpsed and is on the DFG GIS for the previous Segment 1, see Craig Turner).

Segment 10: San Luis Obispo wall flower was observed on the north end of Segment 10, around the edge of the coast live oak woodland/riparian area. No fuel reduction work is proposed for this area. Wallflowers were also observed just outside the NW corner of this segment, again in an area not proposed for fuel reduction work at this time.

North Rucker Road: San Luis Obispo wallflower was observed at several locations on the north end of this segment. Several g.p.s. points were taken adjacent to populations (Craig Turner). The largest group contained over 60 individuals. These individuals are all located generally outside areas proposed for roadside mowing along Rucker Road, and therefore would be fully avoided under the proposed plan.

East Mesa Oaks: A large group of over fifty wallflowers were observed just under the dripline of coast live oak in previously mowed habitat close to Rucker Road on the far eastern end of this segment. Persistence within the mowed area may be due to several factors. If mowing occurs later in the spring, first year individuals may not be affected and second year individuals may have already set seed allowing for persistence. Inconsistent mowing (for instance, it did not appear mowed during the surveys in April/May 2004) may allow the population to persist, and its location, often right next to the dripline canopy of live oaks, may represent locations that are missed by mowing or mowed inconsistently.

<u>Recommended Mitigation Measures:</u>

Segment 1: The location of San Luis Obispo wallflower immediately adjacent to a narrow section of the sewer roadway (and confined on the opposite side of the dirt roadway by willow forest) may be vulnerable to damage if the roadway requires widening for Fire Department vehicles. If widening is necessary, avoidance is likely not feasible. Given that additional plants occur further interior in the immediate vicinity, the potential loss of these 25 individuals may not be significant. If road widening is required, seed could be collected from the individuals prior to widening activity, and distributed in interior areas on suitable habitat. Translocation of first year rosettes to interior locations, performed in late winter or early spring, may also be feasible.

Segment E Mesa Oaks: The population of wallflowers on the east end of this segment occurs in areas that are periodically mowed. We are currently recommending annual mowing of the first fifty feet adjacent to Rucker Road and first fifty feet south of the existing church. Wallflower populations should not be mowed. To achieve this objective, the population area would need to be staked or marked in the field in a manner that would allow the mowing operator to recognize the area should be avoided. The general area should also be examined every few years to determine if new populations occur or locations have shifted.

Fremont's monkeyflower (*Mimulus fremontii*):

Fremont's monkey flower is described by Smith (1998) as an annual herb with yellow flowers that grows on sandy slopes of Burton Mesa woodland and chaparral in Santa Lucia Canyon (just west of the BMER) and near Vandenberg Village on Lompoc-Casmalia Road. It has been recognized as a new variety, but has not yet been published (Smith, 1998). Fremont's monkeyflower is a CNPS List 4. (Presumably, once described, the new variety would be even rarer?) A population of 50-100 individuals was documented by Suzanne Bernstein with LFR Levine Fricke 2003 on the proposed Clubhouse Estates project area, which is located just west of the Burton Mesa Ecological Reserve (adjacent to proposed Fuelbreak Segment 11). About six locations were found there, and it occurs in the open sand, herb dominated community (LFR Levine Fricke, 2004).

Presence at the site: A small population of Fremont's monkeyflower was observed in open sand habitat, just west of the sewer road, in the central portion of Segment 1, close to the seaside bird's beak population. Only five individuals were seen. The population was too small to collect voucher specimens, and the five individuals were difficult to relocate when re-visited in May, 2003. None were observed in Segment 1 in 2004, probably because of insufficient rainfall.

This species is vulnerable to being overlooked and may not emerge in low rainfall years. Plants observed in 2003 were under three inches tall, typically with one or two large (about one inch long) flowers on a tiny green base.

Recommended Mitigation Measures:

The currently known population is outside the current Segment 1 project location, and is set back about twenty feet from the existing sewer roadway. Open habitats in this location are recommended for full avoidance. The population is vulnerable to damage if sewer maintenance activities occur nearby.

Additionally, all fuelbreak segments not surveyed between the months of March and mid-April should be reexamined prior to any fuel break work to ensure that Fremont monkeyflower populations, if any, are detected. Surveys should be performed the season prior to implementing fuel reduction work in years of average to above average rainfall.

Any occupied habitat encountered should be avoided. For segments where Fire Department vehicular access is recommended, there is the potential for unavoidable impacts if a population is located and it is not feasible to avoid the area. Mitigation should be required for unavoidable impacts to this species.

Sensitive Shrubs

La Purisima manzanita (*Arctostaphylos purissima*):

La Purisima manzanita has a very restricted distribution and is endemic to northern Santa Barbara County where it occurs primarily on the Burton Mesa and in the Purissima Hills. It is on the CNPS List 1b. It is threatened by habitat loss to development, habitat fragmentation inappropriate fire regimes. This species often is co-dominant with *A. rudis* and is indicative of classic Burton Mesa-type maritime chaparral. It can also be present in chamise dominated stands, and occurs occasionally to infrequently in Burton Mesa scrub stands. La Purisima manzanita lacks a burl, and therefore does not resprout following wildfires- the species depends upon its stored bank of seed to replace individuals following fires. Its smooth red bark, clasping leaves, pale pinkish white flowers and gnarly branching pattern produce dramatically beautiful individuals. Manzanita berries are a key food source for local wildlife.

Presence at the site: This species is widespread in the local area and occurs in many of the surveyed fuelbreak segments. This species is most abundant in mature to old growth Burton Mesa chaparral extending from Segment 2 through Segment 8. Chaparral in this area may be greater than 70 years of age. Individuals can reach great size, sometimes 10 to 15 feet across and 15 feet tall.

This species was occasional to infrequent in most chamise-dominated stands in the vicinity of Mission Hills and Mesa Oaks.

Potential Project Impacts: La Purisima manzanita will experience a significant reduction in the number of individuals in those segments identified for thinning of shrubs and sub-shrubs, especially where it is a co-dominant. Therefore, significant impacts are likely to occur from the project, especially in Segments 7 and 8. In segments where the species occurs occasionally to infrequently, we would propose that individuals be targeted for retention. It may not always be feasible to retain specific individuals at locations where Fire Department vehicular access may be created or existing paths have to be widened for vehicle use. Therefore, significant impacts could occur outside Segments 7 and 8, but likely will not be as extensive.

If La Purisima manzanitas have to be thinned out, this will involve cutting individual shrubs just above ground with a chain saw or hand saw. Since this species lacks a burl, it may not resprout following cutting. (Do we know about this?).

An additional impact fuel break installation can have will be to prevent wildfires from occurring within the fuel break itself. Wildfires are necessary to stimulate germination of the seed bank to replace individuals lost in the fire. Mechanical removal of individuals to achieve reduced biomass within fuelbreaks will, over time, gradually eliminate this species from the treated fuelbreak itself because seedbank will not be stimulated by wildfires to germinate and therefore, recruitment of replacement individuals would not occur.

Conclusion: there is potential for significant adverse impacts to this species within the proposed fuelbreak segments where shrubs will be thinned to reduce fuelloads or Fire Department access is being created.

Recommended Mitigation Measures:

> Stands where La Purisima manzanita is occasional to infrequent: Avoid and retain all live individuals.
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> Stands where the species will be removed through thinning: Mitigation is required for unavoidable impacts to habitat areas containing this species. Potential mitigation could include the following:
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> **Purchase compensation habitat** at a 2:1 ratio for medium quality or 3:1 ratio for high quality habitat (this is consistent with Santa Barbara County General Plan Guidelines). Habitat should be comparable or higher in quality to that being impacted, and should be in locations that can be effectively managed for habitat value, preferably adjacent to the existing Ecological Reserve. There may be various smaller private land parcels that could be considered for acquisition.
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> **Enhance existing habitat** by protecting it from motor vehicle damage or weed invasion: Installation of barriers followed by localized re-planting of chaparral species, and/or re-distribution of fire-treated seedbank, could be explored on the existing preserve to offset loss of habitat from fuelbreak installation. Elimination of weeds that are overtaking chaparral habitat could also be explored.
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> **Restore chaparral habitat**: Full restoration of type converted areas that could support Burton Mesa chaparral (including La Purisima manzanita) is also a potential mitigation measure. This may be extremely difficult to achieve, however. To date, restoration of areas cleared in the past for farming, and now dominated by annual grasses, mustards, or other ruderal species, has yet to be successfully achieved. Further experimentation to identify effective techniques to restore this habitat should be pursued.

Shagbark manzanita (*Arcostaphylos rudis*):

Shagbark manzanita is endemic to the central coast of California where it occurs on old stabilized sand dunes from southern San Luis Obispo County to northern Santa Barbara County. This species is threatened by habitat loss due to development, declines due to inappropriate fire regimes, and fragmentation of remaining habitat supporting the species. Shagbark manzanita, as the name implies, has a shredded shaggy bark rather than the smooth bark more typical of other species of manzanita. Shagbark manzanita is frequently a co-dominant in Burton Mesa chaparral stands. Shagbark manzanita differs from La Purisima manzanita in that it can resprout after wildfires.

Presence at the site:

This species is most abundant and dominant in mature to old growth stands in Segments 2 through 8. The species is common to occasional or infrequent in other fuelbreak segments vegetated with Burton Mesa scrub or chamise-dominated areas. As with La Purisima manzanita, old growth individuals are large and form nearly impenetrable stands.

Potential Project Impacts: Shagbark manzanita will experience a significant reduction in the number of individuals in those segments identified for thinning of shrubs and subshrubs, especially at locations where it is a co-dominant. Therefore, significant impacts are likely to occur from the project, especially in Segments 7 and 8. In segments where the species occurs occasionally to infrequently, we would propose that individuals be targeted for retention. It is possible it may not always be feasible to retain specific individuals at locations where Fire Department vehicular access may be created or existing paths have to be widened for vehicle use. Therefore, significant impacts could occur outside Segments 7 and 8, but likely will not be as extensive.

Other impacts associated with installation of the fuelbreak project may be similar to that described for La Purisima manzanita. Individuals removed by cutting to achieve reduced shrub cover within fuelbreaks may resprout at the base, but are unlikely to achieve the large size and habitat value compared with those found in natural stands. Ongoing fuelbreak maintenance would likely prevent treated individuals from recovering much biomass. Although this species is recognized as re-sprouting after wildfires, recruitment of new individuals from seed is still important to the overall survival of the species in a given area. Therefore, fuelbreak areas that would no longer be subject to natural fire regimes will likely experience declines in shagbark manzanita, even if the species is avoided and retained in those areas.

Conclusion: there is potential for significant adverse impacts to this species within the proposed fuelbreak segments where shrubs will be thinned to reduce fuelloads or Fire Department access is being created.

Recommended Mitigation Measures: see discussion under La Purisima manzanita.

Lompoc ceanothus (*Ceanothus cuneatus* var. *fascicularis*):

This variety of ceanothus is an important component of maritime chaparral and coastal sandy mesas in Santa Barbara and San Luis Obispo counties. It is a CNPS List 4 plant. Ceanothus require periodic wildfires to stimulate germination of the seedbank for replacement of individuals and generally does not resprout after fires.

Presence at the site: Lompoc ceanothus is fairly common in stands of Burton Mesa chaparral and occurs occasionally to infrequently in other habitat types on the Ecological Reserve, including Burton Mesa scrub and chamise-dominated stands. As chaparral stands mature and age, Lompoc ceanothus becomes decadent and eventually dies out. This process creates natural openings within otherwise dense chaparral, allowing for establishment of pockets of annual herbs (Odium et al. 1993). Occasionally, Lompoc ceanothus occurs in somewhat dense patches- this was observed Segments 2, 3 and 4, west of the high school.

Potential Project Impacts: Lompoc ceanothus could experience a significant reduction in the number of individuals within fuelbreaks slated for thinning of shrubs, especially in segments supporting Burton Mesa chaparral. Overall project impacts are similar to those described for La Purisima and shagbark manzanitas.

Recommended Mitigation Measures: see discussion under La Purisima manzanita.

Santa Barbara ceanothus (***Ceanothus impressus*):**

Santa Barbara ceanothus is endemic to northern Santa Barbara County and southern San Luis Obispo County, occurring on sandy mesas and Bishop Pine forest, especially at locations that have burned (Smith, 1998). The species has no current listing status. It is frequently shorter, with denser, more compacted foliage than Lompoc ceanothus. It has deep blue flowers and small dark green leaves with deep veination (hence the Latin name *impressus*).

Presence at the site: The species is not particularly common on the Burton Mesa Ecological Reserve, except southwest of Highway One, in stands which burned in the mid 1990's. It appears to be associated with shallow soil areas where the chaparral is not as tall (Odion, et.al. 1993). Occasional individuals were observed in Segments 1, 3, 4, 6, 7, 8, and west and east Mesa Oaks.

Potential Project Impacts: We propose to avoid any direct impacts to this species by not removing any individuals for the purposes of thinning vegetation. There is modest potential for direct impacts should fire department vehicular access need to be expanded and existing paths or routes widened. This is mostly likely to be an issue in Segments 7 and 8. Provided that few individuals are affected, this potential impact is probably less-than-significant.

There is the potential for indirect impacts due to loss of the natural fire regime within proposed fuelbreak segments. Therefore, fuelbreak areas that would no longer be subject to natural fire regimes will likely experience declines in Santa Barbara ceanothus, even if the species is avoided and retained in those areas.

Recommended Mitigation Measures:

1) Retain all living individuals with fuelbreak segments, unless they are in the way of Fire Department Vehicular access.
2) Indirect impacts stemming from loss of rejuvenating wildfire events within the fuelbreaks should be mitigated in a similar manner to that described for La Purisima manzanita. Acquisition of compensation habitat, habitat restoration, or other such mitigation measures, should ensure that this species is represented in the mitigation area.

Chaparral mallow (*Malacothamnus* sp.):

This shrub was identified as an unknown taxon from the Burton Mesa (Smith, 1978). It was subsequently described to be scarce as a form on the Burton Mesa under *Malacothamnus fremontii* (Tehachapi bush mallow) in Smith, 1998. The taxonomy of this group is under further study (Dr. Deiter Wilken, pers.comm). It therefore should be treated as a local endemic and conserved where found.

Presence on the site: This shrub was only observed in the North Mission Hills segment, and appeared confined to the disturbed habitat between Calle Lindero Road and the dirt roadway leading to the La Purisima sector. It may also be present nearby in the north Rucker Road segment, although it was not specifically noted.

Potential Project Impacts: This shrub occurs in the North Mission Hills segment in an area proposed for some fuel reduction work. No removal of living shrubs was recommended here under the current proposed project. Individual chaparral mallow should not be removed from the treated area. Individual shrubs are somewhat lanky and not very twiggy, suggesting they do not contain a lot of biomass.

Conclusion: This plant will be fully avoided within the treatment areas.

Sensitive Subshrubs

A suite of local, endemic subshrubs occur in Burton Mesa chaparral, Burton Mesa scrub, coast live oak woodland and chamise-dominated shrublands on the Burton Mesa. Examples include the following:

Lompoc bush monkey flower (*Mimulus aurantiacus* ssp. *lompocense*)

Prickly phlox (*Leptodactylon californicum* ssp. *tomentosum*)
tomentose form at Burton and Nipomo Mesas

Bush groundsel (*Senecio flaccidus* var. *douglasii*)
An unusual green form with highly dissected leaves is scattered in sandy chaparral-covered hills behind La Purisima Mission, Burton Mesa, to Orcutta and northeast of Buelton (Smith, 1998).

Purple nightshade (*Solanum xantii* var. *hoffmannii*)
Variety *hoffmannii* is reported to be a northern Santa Barbara County endemic, generally glabrous. Forms on the Burton Mesa are pubescent and appear to be intermediate to the species (Smith, 1998).

Presence at the site: Lompoc bush monkey flower is the most widespread and common of these subshrubs. It occurs in most segments and favors stands of Burton Mesa scrub and driplines around coast live oak woodland, or locations in chaparral shaded by coast live oaks. Prickly phlox occurs occasionally, and is particularly noticeable in flower in early spring. Individuals generally are not numerous, and sometimes, they climb up through other low growing shrubs. Bush groundsel was only noted in the N Rucker Road segment. Purple nightshade occurs as occasional individuals at the urban-wildland edge, and is often seen in open, slightly disturbed habitats. Purple nightshade was noted in Segments 2 through 8, Segment 10, and North Rucker Road.

Project Impacts: These subshrubs are generally small in stature and do not produce much biomass. Therefore, we anticipate that there will be no direct, intentional removal of bush groundsel, prickly phlox and purple nightshade. It is possible that an individual of these species could be inadvertently removed within treatment areas where dead brush is removed or shrubs are thinned. This potential impact is anticipated to be less-than-significant.

Due to its abundance, impacts to bush monkey flower are likely to be significant in those segments slated for thinning of brush. It is likely that cut individuals will reshoot following cutting. We do not know how long a reshooting individual will persist.

Recommended Mitigation:

Mitigation is required for loss of bush monkey flower within segments that will be thinned of living brush. Mitigation options would generally follow those described for La Purisima manzanita.

Sensitive Trees

Coast live oak (*Quercas agrifolia*):

Coast live oaks are an important tree species that is present in much of the Burton Mesa chaparral and scrub habitats. Coast live oaks growing on the Burton Mesa sand formation are known for their unique growth form. Specifically, these trees frequently are shorter than typical coast live oaks growing on firmer substrates, exhibit multiple trunks and can have very large limbs emerging low from the central trunk, sometimes even lying on the ground. Coast live oak is an important component of most stands of manzanita-dominated Burton Mesa chaparral, where individual oaks emerge above the shrub layer below. Coast live oak cover in these stands is typically between 5-15%. Individuals are typically widely spaced. Individual coast live oaks can also be present in Burton Mesa scrub and chamise-dominated stands, although usually, they are less frequent than in chaparral.

Where coast live oaks occur in patches and where their canopies merge, these areas can be classified as coast live oak woodland. Coast live oak woodland consists of groups of trees ranging from 15 to 30 feet in height. Canopies of individual trees are frequently touching. The understory beneath individual trees is sometimes open, with dense leaf litter and little other vegetation. More typically, shade-tolerant species occur such as abundant poison oak (*Toxicodendron diversiloba),* coffee berry *(Rhamnus californicus*), wild cucumber (*Marah fabaceous*), woodmint (*Stachys bullata*), California chenopod (*Chenopodium californicum*), paeony (*Paonia californica*), and the saprophytic Indian warrior (*Pedicularis densiflora*).

The coast live oak dripline and adjacent areas immediately outside the oak canopy represent important microsites for Burton Mesa endemic shrub species and shrub species requiring more mesic growth conditions. These areas also tend to support young oaks which may eventually replace mature trees. The rare endemic Burton Mesa manzanitas can often occur as individuals or in small patches just outside the canopy of coast live oak woodlands. This zone is also important for the endemic Lompoc monkey flower (*Mimulus aurantiacus* spp. *lompocensis*) and prickly phlox (*Leptodactylon californicum,* a tomentose form unique to the Burton Mesa). Occasionally, the rare endemic Lompoc ceanothus (*Ceanothus cuneatus* var. *fascicularis*) occurs here. Where shrub vegetation has been gradually overtopped by the oak canopy, decadent shrub biomass is common around the drip line.

Individual coast live oaks and coast live oak woodlands provide important habitat for an array of wildlife species. Dusky-footed woodrat, for example, depends upon coast live oaks and associated mature to decadent shrub vegetation for denning and foraging habitat.

Coast live oaks are considered less susceptible to carrying wildfire than chaparral vegetation (Todd Keeler-Wolf, pers.comm). A canopy fire is more likely to reach oak canopies where decadent shrubs occur around the drip line, creating a fuel ladder effect.

Presence at the site: Individual coast live oaks are present in almost every proposed fuelbreak segment. Coast live oak woodlands were observed in Segment 1, Segment 6, Segment 10, Segment 12 and South Vandenberg Village.

Potential Project Impacts:

Uplifting of coast live oaks and removal of flammable material:

Impacts on Vegetation: The fire department has requested we uplift the lower oak canopy by removing limbs, twigs, living and dead biomass below six feet in height, and dead material above six feet in height. This may cause substantial adverse impacts to the health and vigor of remaining trees and associated wildlife habitat value. While the overall height of live oaks varies at the Burton Mesa, individual trees are usually under twenty feet tall. In certain locations, trees can be even shorter. For instance, most of the live oaks in Segment 1 are around 12 feet tall. Branches commonly reach the ground. The impact of uplifting the canopy to six feet above ground will varying, depending upon the overall health, vigor and stature of the tree in question. For example, coast live oaks near Highway 1 were observed to be around 12 feet tall- uplifting by 6 feet could remove half the tree's canopy. Several dense patches of oak woodland in the central portion of Segment 1 are about 15 to 20 feet tall- uplifting by six feet could remove 1/3 of the biomass. It is likely that the removal of 1/3 to ½ of the overall canopy of a given tree will lead to reduced health and vigor and could cause the gradual decline and death of treated individuals.

A variety of factors will change if oak canopy is removed. Loss of living biomass will reduce the amount of leaves which photosynthesize and provide the tree with its energy for survival. The physical biomass of twigs, limbs and leaves captures fog drip and less biomass would reduce the amount of fog drip captured. Fog drip may provide an important source of additional moisture for tree growth. Physically opening up the lower canopy of the tree will expose this area to increased solar radiation and increased wind, which could lead to sun damage on tree trunks and tissue that was previously shaded, and expose the oak understory to increased dryness. Increased dryness and increased solar radiation beneath oaks could lead to loss of shade-loving understory plants, invasion by weeds, and damage to soil micro-organisms essential to nutrient cycling in the oak leaf litter below. Opportunities for recruitment of new oaks and certain rare endemic plant species which favor the oak drip line could be reduced if trees are uplifted.

Impacts to Wildlife: Uplifting the oak canopy and removing flammable dead material will have substantial adverse impacts to wildlife habitat values. Dead woody material and moist oak leaf litter often supports fungal and insect species which are fed upon by wildlife species such as western grey tree squirrels, dusky-footed woodrats, reptiles, amphibians and many bird species. Dead fallen logs are often nesting sites for salamanders, snakes and other reptiles. Hollow logs and tree limbs provide nesting sites for certain species of birds and small mammals.

The large dens of dusky footed woodrats may be targeted for removal because of their flammability. This will result in loss of those individual dens. It is likely this species will substantially decline in number within treated segments subject to uplifting of oaks and/or removal of decadent material and thinning of shrubs. Loss of suitable nesting sites, loss of material used for nest construction, and loss of shrub cover which contributes to the suitability of these areas to sustain woodrat populations will likely occur. Loss of woodrats here will have a cascading effect on predators who feed on this species.

Recommended Mitigation Measures:

1) We propose to limit uplifting of coast live oak to the following specific conditions: a) in association with the edge of Fire Department vehicle access routes; b) in association with mowed areas along roadsides (like West Rucker Road); c) limited uplifting may occur in association with removal of decadent shrubs around oak driplines.

2) Uplifting will be limited to from two to five feet above the ground. No more than 1/5 of the total canopy shall be removed.

3) Woodrat dens will be retained where they occur, and decadent material and dead brush associated with the surrounding five to eight feet around dens will not be disturbed.

4) We propose to retain downed logs and downed branches four inches in diameter or greater.

5) Oak leaves will not be removed from beneath the canopy.

Sensitive Plant Communities

Most of the shrub-dominated habitat types at the Burton Mesa Ecological Reserve can be considered sensitive, and represent habitats in decline in the local and regional area. Because of the presence of numerous endemic species, including shrubs, subshrubs and forbs, most of the project area can be considered sensitive and impacts from fuel break installation are potentially significant. Additionally, some locations on the Ecological Reserve in proposed segments represent lands previously set aside to offset loss of habitat from development. Examples of these locations include Segment 1 and 2 (originally acquired by Santa Barbara County); habitat associated with Segments 3, 4, and 5 (part of an original 200 acre set aside by Unocal in the early 1990's to offset impacts from pipeline construction); Segment 6 (located on a county managed parcel and called the Kelly-Gusman Preserve) set aside when the North Oaks development went in. Therefore, impacts to sensitive plant species and their associated habitats are even more

significant if fuel break installation occurs in locations that were preserved to mitigate habitat losses elsewhere.

Several other types of habitat do occur within the fuelbreak segments and are discussed briefly below:

Willow Riparian Forest: Forested riparian areas were only encountered within proposed fuelbreak segment 1.

Segment 1 contains a well-developed riparian forest associated with perennial to intermittent streamflow. This streamflow is now controlled by two storm drains which emerge from the Vandenberg Village development, whereas, in the past, streamflow in this area was probably natural. A detailed inventory of this area of Segment 1 was not conducted. The area is vegetated primarily by arroyo willow (*Salix lasiolepis*) with some yellow willow (*Salix lucida* ssp. *lasiandra*). There are extensive patches of basket rush (*Juncus textilis*) and carex (*Carex sp.*) as well as occasional patches of cattail (*Typha* sp.*).* The willow forest lies within a larger matrix of coast live oak woodland.

Proposed Fuel Reduction Work for Segment 1: We currently are proposing limited hand work within the riparian area. We propose to remove flammable invasives, which are primarily pampas grass and some escaped exotics like small pine trees and small palm trees. Some flammable yard wastes were recently deposited on the upstream end of the willow forest, and we plan to remove and chip this material. No removal of riparian trees or associated shrubs and wetland plant species is proposed.

Coast Live Oak Riparian Forest: The northernmost end of Segment 10 supports an ephemeral drainage that was probably the upper end of Davis Creek, prior to construction of the golf course and surrounding housing development. Surrounding this drainage is a stand of large, tall coast live oaks with a riparian understory. Understory species include mugwort (*Artemesia* sp.), blackberry (*Rubus ursinus*), redberry (*Rhamnus crocea*), and wild rose (*Rosa californica*). A red-shouldered hawk nest was noted in the area. Evidence of an old water impoundment was observed (probably it was dammed up for livestock water in the past- there is evidence of berms). A portion of the coast live oak forest associated with this location has been subjected to clearance of the understory by the adjacent landowner, and a substantial part of the area was converted to lawn and fenced into a yard.

No fuel reduction work or fire department vehicle access is proposed for this location.

Isolated Willows: We observed occasional isolated arroyo willows (*Salix lasiolepis*) at various locations in fuelbreak segments. These were primarily located in Segment 3 and 4, and Segment 6 and 7.

No willows will be removed or pruned for fuel reduction work.

Localized seasonal wetlands:

Small seasonal wetlands were observed in several fuelbreak locations. These were mostly found in proposed fuelbreak segments 7 and 8. These areas are associated with a system of ditches, installed to intercept sheet flow just above the existing housing project. Flows are carried to nearby storm drains. Wet areas form at the lowest point here and there along these ditches. Wetland vegetation in these areas was mostly dominated by non-native species such as sheep sorrel (*Rumex acetosella*), umbrella sedge (*Cyperus* sp.) and garden escapes. A small amount of basket rush was seen (*Juncus textilis*).

A larger and more well-developed wetland was observed on private land in Segment 6. This area supports a number of willows, broad patches of basket rush, some patches of *Carex*, and a few cattails.

Potential Project Impacts: no fuel reduction work is proposed for these seasonal wetlands.

Additional Plant Conservation Measures

The following general measures should be required for inclusion in fuelbreak treatment efforts to further minimize adverse impacts to native vegetation and soils:

1) Fuelbreak treatments (other than mowing) should be undertaken from September through December in order to minimize trampling of young herbaceous plants. It may be acceptable to extend the treatement window through the end of February in more disturbed portions of the fuelbreak where native annual forbs are less common.

2) Work should be undertaken during dry periods to the maximum extent feasible. If work is scheduled after the onset of the rainy season, at least one week of dry weather should occur to prevent damage to soils and vegetation.

3) Equipment and personnel should be cleaned and inspected to reduce chances for introducing invasive plants into treatment areas.

4) Staging areas should not be located in weedy areas in order to prevent spread of weed propagules.

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List of Tables (included as separate files)